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Abstract

INDUSTRIAL APPLICATION OF CATALYTIC PRECIPITATION OF URANIUM

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The recent investigations have verified that the process of reduction of U (VI) to U (IV) is the catalytic one in which the selection and form of catalyst have a large influence on the feasibility of the process.

It has been demonstrated that the process of reduction of U (VI) to U (IV) from the water solutions of sodium carbonate is best carried out with UO_2 as a catalyst, which is at the same time produced by the reaction itself.

Laboratory and pilot plant experiments with the nickel wire pointed out that the uranium oxide is deposited on the surface of the wire. The thickness of the deposited oxide ranged up to and more than 5 millimeters, and the density ranged from 4 to 5 g/cm^3. The process of reduction was developing with catalyst deposited in this way. To check catalytic abilities of uranium dioxide without the presence of nickel wire the reduction process has been studied and the results of the application of uranium-dioxide in the form of powder and "rachige" rings have been demonstrated.

The activation of catalyst at the increased temperature, in hydrogen stream have been illustrated. This kind of activation enables the application of such catalyst for the precipitation of uranium from the alkaline solutions at a temperature below 100°C, at normal hydrogen pressure.

Based on the results of the laboratory pilot plant experiments, the construction of full scale plant for continuous uranium precipitation from carbonate leaching solutions has been undertaken.

The description of the plant and the basis for the selection of processing, together with results and analysis was also presented.

The effect of precipitation of uranium as a function of the application of uranium dioxide as a catalyst retention time, concentration of agents and uranium, method of agitation, temperature and pressure has been analysed.